

MATH-492

**Representation theory of semisimple lie algebras**

Testerman Donna

Cursus	Sem.	Type
Ing.-math	MA1, MA3	Opt.
Mathematics for teaching	MA1, MA3	Opt.
Mathématicien	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Written
Workload	150h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

We will establish the major results in the representation theory of semisimple Lie algebras over the field of complex numbers, and that of the related algebraic groups.

**Content**

Highest weight theory  
 Universal enveloping algebra  
 Construction of irreducible representations  
 Weyl's degree formula  
 Freudenthal's formula.

If time permits, construction of Chevalley groups and simple algebraic groups.

**Learning Prerequisites****Required courses**

Theorie des Groupes, Anneaux et corps, Algebres de Lie semisimples

**Important concepts to start the course**

The classification of complex semisimple Lie algebras. Root systems.

**Teaching methods**

Lectures

**Expected student activities**

Exercises, extra reading, presentation of exercises.

**Assessment methods**

Final written exam

Dans le cas de l'art. 3 al. 5 du Règlement de section, l'enseignant décide de la forme de l'examen qu'il communique aux étudiants concernés.

**Supervision**

Office hours	Yes
Assistants	Yes

**Resources**

### **Bibliography**

James Humphreys : Introduction to Lie algebras and Representation Theory.

Bourbaki, Lie algebras and Lie groups, Chapters 1 - 3.

### **Ressources en bibliothèque**

- [Introduction to Lie algebras and Representation Theory / Humphreys](#)
- [Lie algebras and Lie groups / Bourbaki](#)